WHO CAN HANDLE THE SEASONS OF HER LIFE? PREDICTORS OF PERCEIVED LIFE DISRUPTION DURING THE ADOLESCENT TRANSITION

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ABSTRACT

The present study investigates the underlying cognitive, social, and behavioral tendencies that may explain why some girls are more likely to perceive the transition from childhood to adolescence as disrupting and difficult. N = 188 girls (M_{age} = 11.70 years) reported on their level of pubertal development, rumination, rejection sensitivity, and peer relationships at two time points. Structural equation modeling results suggested that girls prone to rumination and angry rejection sensitivity were most likely to report their lives as significantly disrupted from the way it was one year prior. These tendencies better explained perceptions of life disruption than overall levels of pubertal development. These findings are the first to characterize longitudinal predictors of perceived life disruption for girls and have important implications for well-being intervention efforts during the early adolescent period.

BIOGRAPHICAL SKETCH

Mary Kate Koch is a graduate student in the department of Human Development at Cornell University. Her research interests center on examining the subjective experiences and perceptions of puberty that can affect developmental outcomes. She received her Bachelor of Arts in the fields of psychology and history from Gonzaga University in 2015.

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Introduction

Developmental transitions constitute enduring changes to the warp and weft of daily life. These transitions encompass the myriad life events that mark the passage from one developmental period to another (i.e. childhood to adolescence). Subsequent individual interpretations of a transition can shape the importance and emotional significance of events from that period throughout the lifespan (Thomsen, Steiner, & Pillemer, 2016). The adolescent transition is notably one during which developmental trajectories begin to diverge. While the biological changes of puberty are universal in occurrence during this transition, the social experience of these changes is distinctive to the individual. Understanding which youth find the changes associated with the adolescent transition to be more disrupting to their lives may help explain individual differences in developmental outcomes.

Although the adolescent transition is a time of significant biological and social change for all youth, it is clear that some youth report significantly more problems, distress, and life difficulties during this time than others (Petersen & Hamburg, 1986). While both boys and girls are likely to experience change and upheaval during puberty, all extant literature suggests that puberty is more challenging and stressful for girls than for boys and that girls are at elevated risk for negative outcomes (e.g. Ge, Conger, & Elder, 2001). In addition, research indicates that girls report more interpersonal stressors than boys (Hankin, Mermelstein, & Roesch, 2007) and have a greater propensity to ruminate (Rood, Roelofs, Bögels, Nolen-Hoeksema, & Schouten, 2009). These tendencies may place girls at heightened risk for feelings of life disruption amid transitional change.

Problems during the adolescent transition are often attributed to the reality that the sweeping social and biological changes associated with puberty affect nearly all domains of life.

Substantial research indicates that the adolescent transition is associated with changes in peer relationships (Rudolph, 2002), family relationships (Baer, 2002), and academics (Martin & Steinbeck, 2017). As these changes unfold, they may serve as building blocks for how girls renegotiate and perceive themselves. While some girls navigate these shifts adaptively, others may find that these normative changes give rise to a feeling of *role disruption*, or the sense that daily life, relationships, and activities have significantly changed (Rudolph, Kurlakowsky, & Conley, 2001). More broadly, role disruption constitutes the perception that current life circumstances are both different and more difficult than they used to be.

The present study leveraged longitudinal data from early adolescent girls, to understand which girls are most likely to perceive their lives as substantially changed and disrupted during the adolescent transition. While perceptions of life changes are implicit in the literature characterizing psychological distress during puberty and the adolescent transition, they have received little explicit attention. However, perceptions of significant life changes may help explain the divergence of developmental trajectories during the adolescent transition. Perceived life disruption captures negative interpretations of normative changes associated with puberty. This may serve as an antecedent to negative developmental outcomes and may help identify which girls are most likely to be at-risk during and after the adolescent transition. For instance, findings have shown that greater perceived role disruption is associated with greater perceived helplessness in matching domains (i.e. feeling disrupted in school is associated with feeling helpless in school) both in the short- and long-term (Rudolph, Kurlakowsky, & Conley, 2001). Given that attributions of helplessness are well-established as prodromal predictors of depression (e.g. Nolen-Hoeksema & Girgus, 1995), measuring perceptions of role disruption may identify

at-risk youth earlier in the developmental process than studies which focus on depression as the central psychosocial outcome.

Individual predispositions

One explanation for psychological distress during the adolescent transition is the *accentuation hypothesis* proposed by Caspi and Moffit (1991) which states that individual predispositions are intensified during stressful transition periods. Youth tend to select, process, and contribute to their environments in ways that maintain their individual predispositions over time (Ge, Conger, & Elder, 1996). Because clear or familiar contextual information is often absent from the novel and ambiguous situations of the adolescent transition, youth will tend to rely on pre-existing dispositions or expectations to guide their perceptions and reactions. Accordingly, the normative changes that occur across the adolescent transition may accentuate cognitive and behavioral tendencies that increase the propensity to perceive changing life circumstances as particularly difficult and disrupting.

Although numerous individual tendencies may be amplified during the adolescent transition, rumination, rejection sensitivity, and peer problems stand out as particularly likely to explain associations of pubertal status with perceived changes in daily life. Rumination and rejection sensitivity can be described as cognitive tendencies, which characterize the way that individuals perceive, interpret, and reflect on their internal and external experiences. Rumination and rejection sensitivity may be particularly salient for girls at puberty and represent stable individual differences that can contribute to perceptions of the adolescent transition, as adolescent girls are more likely to ruminate than boys and preadolescent girls (Rood, Roelofs, Bögels, Nolen-Hoeksema, & Schouten, 2009; Hampel & Petermann, 2005), and tend to be more anxious about social status following transitions than boys (London, Downey, & Bonica, 2007).

Rumination is characterized as a repetitive and passive cognitive focus on the experience of being distressed and the causes and consequences of this distress (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Rumination is often employed in an attempt to better solve problems. However, rumination typically leads to worse interpersonal problem-solving (Lyubomirsky & Nolen-Hoeksema, 1995) and worse solution implementation (Ward, Sousa, & Nolen-Hoeksema, 2003). Accordingly, girls predisposed to rumination may be most likely both to perseverate on the changes associated with the adolescent transition and be less effective at solving problems in this new developmental context. This may leave girls who ruminate especially likely to view life changes surrounding puberty and the adolescent transition as particularly disrupting and difficult. For this reason, I examined whether rumination mediates effects of puberty on role disruption in the present study.

Rejection sensitivity is the tendency to expect, perceive, or over-react to the possibility of social rejection (Downey Lebolt, Rincon, & Freitas, 1998). There are two subtypes of rejection sensitivity: anxious and angry. Anxious rejection sensitivity is more closely associated with internalizing and friendship instability, whereas angry expectations of rejection are associated with increased conflict and aggression (Croft & Zimmer-Gembeck, 2014; London, Downey, & Bonica, 2007). The social upheaval associated with the adolescent transition (i.e. moving to middle school) provides a particularly salient context for rejection sensitivity. The increased importance and fragility of peer relationships during the adolescent transition may magnify individual differences in rejection sensitivity so that girls who are predisposed to anxious or angry rejection expectations perceive this transition as especially precarious and disrupting to their peer and friend groups.

Further, rejection sensitivity and rumination may work strongly in relation to each other. Girls who expect and perceive rejection in the moment of a social interaction may leave that interaction and continue to perseverate on the causes and consequences of the perceived rejection. Indeed, rejection sensitivity has been prospectively linked to rumination (Pearson, Watkins, & Mullan, 2011). Subsequent increases in rumination may also lead to increases in rejection sensitivity as dwelling on past rejection may serve as a guide for rejection expectations in the future.

During the adolescent transition, some of the most important social context changes occur in relationships and interactions with friends and other children of the same age (Rudolph, 2002). Increased problems with peers may reduce perceived social support and increase perceived difficulty adjusting to life changes. As with rumination and rejection sensitivity, research indicates that girls report more interpersonal stressors than boys (Hankin, Mermelstein, & Roesch, 2007), and are more concerned about peer evaluation and the maintenance of harmonious relationships (Rose & Rudolph, 2006; Rudolph, 2002). Accordingly, girls may feel particularly sensitive to peer problems and their consequences. Further, prior research suggests that rumination and rejection sensitivity correlate with peer problems due to negative interpersonal outcomes such as isolation (Nolen-Hoeksema & Davis, 1999), friendship instability and aggression (Croft & Zimmer-Gembeck, 2014), and peer victimization (McLaughlin & Nolen-Hoeksema, 2012). The primary aim of the current study is to examine whether rumination, rejection sensitivity, and peer conflict mediate effects of pubertal development on perceived role disruption during the adolescent transition.

Individual differences in pubertal development

Finally, girls who mature earlier than their peers may be particularly vulnerable to perceiving disruption during the adolescent transition. The rate at which a girl matures compared to an anchor value (either calculated from national or sample-specific norms) is known as pubertal timing, whereas pubertal status measures the extent of physical development at a given point in time (Dorn, Dahl, Woodward, & Biro, 2006). Substantial literature has demonstrated that girls who experience early pubertal timing are more vulnerable to a gamut of problems that runs from depression to school dropout (reviewed in Mendle, Turkheimer, & Emery, 2007). It may be that girls who mature earlier are at heightened risk for perceived disruption because they must navigate both the physical and social changes of the adolescent transition while looking and feeling different from the majority of their same-age peers. This may increase perceptions that life circumstances have changed to be more difficult and different than they used to be. Conversely, it is possible that the normative changes and stressors inherent in the pubertal transition are enough alone to magnify individual predispositions and role disruption. Further, the potential effects of puberty on perceived disruption may be due in part to the perceived lack of control girls have over physical changes occurring and when they occur. Girls may feel as though changes in other domains are more difficult and disrupting because they coincide with physical changes already beyond their immediate control. The present study examined and compared the effects of both pubertal status and timing in order to determine potentially different relationships with role disruption.

The present study

This study examined the underlying factors that might influence perceived role disruption longitudinally. It was anticipated that individual predispositions would mediate the stress of the adolescent transition and, as a result, explain how pubertal change leads to perceived role

disruption four months later. The measurement of role disruption at the second time point coincided with the start of a new school year. Accordingly, girls were comparing their lives during the present school year to the way it is during the start of the previous school year. The constructs of rumination, rejection sensitivity, and peer problems were explicitly chosen because of their likelihood as mediators. Drawing from the accentuation hypothesis (Caspi & Moffit, 1991), it was anticipated that rumination, rejection sensitivity, and peer problems would be accentuated by the stress of the adolescent transition and, as a result, better explain perceived role disruption at a later point in time. In order to investigate the processes through which puberty leads to disruption, the present study examined three central questions: (1) Do Time 1 pubertal status and timing have direct effects on Time 2 perceived life disruption?; (2) Do individual differences in rumination, rejection sensitivity, and peer difficulties directly influence perceived life disruption?; (3) Do pubertal status and timing have indirect effects on perceived life disruption through rumination, rejection sensitivity, and peer problems?

Method

Participants

This sample included 188 girls recruited through a research partnership with New York State 4-H. Participating girls were recruited through summer youth activity programs in 2015 and 2017. Recruitment was facilitated through advertisement via emails and canvasing parents at activity drop-off. Girls participated in two waves of data collection approximately four months apart. The average age was 11.70 at the start of the study (*SD* = 1.05) and 12.00 (*SD* = 1.04) at follow-up. In this sample, youth self-identified as primarily European American (83%), Southeast Asian (5.24%), East Asian/Pacific Islander (3%), American Indian/Native (2.25%), African American (1.87%), Hispanic/Latino, (1.12%) and other (3.37%). The study was approved by the Institutional Review Board at Cornell University. Parents or legal guardians

provided informed consent prior to study participation and all girls provided assent at the time of measurement.

Measures

Puberty. The Pubertal Development Scale (PDS; Petersen, Crockett, Richards, & Boxer, 1988) is a self-report scale that assesses changes in body hair, skin, height, and breast size to measure physical maturation. Items on the PDS are measured using a 4-point scale, where 1 = *no changes yet* and 4 = *seems completed*. The mean PDS score at baseline measurement was 10.02 (*SD* = 2.58; Range: 3-16). The summed PDS score was used as an indicator of pubertal status, with higher scores indicating greater levels of pubertal development. Pubertal timing was operationalized as the deviation from a girl's actual PDS sum score from her predicted PDS sum score at her age of measurement (Dorn, Dahl, Woodward, & Biro, 2006). Accordingly, greater residualized scores indicate greater pubertal development than the average development reported by girls of the same chronological age (i.e. earlier maturation than same-aged peers).

Role Disruption. Perception of changes in life circumstances was assessed with the Role Disruption Questionnaire at Time 2 (RDQ; Rudolph, Kurlakowsky, & Conley, 2001). The RDQ is a 20-item self-report measure that asks respondents to rate how disrupted they currently feel relative to the previous year (e.g. *"Compared to last year, I feel like I do not fit in as much with other kids at school"*). Items reflect experiences in multiple domains, which include academic, peer, friend, and family. Each item is rated on a 5-point scale, ranging from 1 = *not at all* and 5 = *very much.* Responses were summed together for an overall score of role disruption. Scores ranged from 20 to 83 (M = 35.05, SD = 12.08) at follow-up, with higher scores indicating greater perceived disruption. Academic, parent, peer, and friend disruption subscale scores were calculated by summing responses to the five items that correspond with each of the four

subscales. Overall scale reliability was substantial (Cronbach's $\alpha = 0.90$). Subscales were also assessed for longitudinal measurement invariance and results indicated that all but the friend disruption subscale achieved configural invariance (see Appendix A for analyses and discussion).

Rumination. The Ruminative Response Scale of the Children's Response Styles Questionnaire (Abela, Brozina, & Haigh, 2002; Abela, Aydin & Auerbach, 2007) was used to assess tendencies towards rumination at Time 1. The Ruminative Response Scale is a 13-item self-report measure of self-focused, cognitive responses to feelings of sadness modeled after the adult version of the Response Styles Questionnaire (Nolen-Hoeksema & Morrow, 1991). Items include "When I am sad, I go away by myself and think about why I feel this way" and "When I am sad, I think about my failures, faults and mistakes." Each item is scored on a 4-point scale where 0 = *almost none of the time* and 3 = *almost all of the time* and a sum score was calculated from item responses. Summed scores on the Ruminative Response Scale ranged from 0 to 39, ($M = 13.28$, $SD = 8.89$). Overall scale reliability was substantial ($\alpha = 0.89$).

Rejection Sensitivity. The Children's Rejection Sensitivity Questionnaire – 6 Item Form (Downey, Lebolt, Rincon, & Freitas, 1998) is a self-report measure that assesses the dispositional tendency for children to expect, perceive, or over-react to social rejection or potential social rejection. Participants are presented with six scenarios and asked to generate separate assessments of how nervous and mad they would be in these circumstances. Scenarios include situations such as being chosen by peers for a group project or confronting a friend after a fight. Items are scored on a 6-point scale where 1 = *not nervous/not mad* and 6 = *very, very nervous* or *very, very mad*. Participants are also asked to assess the likelihood of a positive outcome for each scenario, where 1 = *YES!!!* and 6 = *NO!!!* Anxious Rejection Sensitivity scores

were calculated by multiplying the nervousness rating by the likelihood evaluation for each item and then summing these products. Angry Rejection Sensitivity scores were calculated by multiplying the mad rating by the likelihood evaluation for each item and then summing these products. In this sample, the mean Anxious Rejection Sensitivity score was 9.23 (*SD* = 4.89, Range: 1.50 to 25) and the mean Angry Rejection Sensitivity Score was 7.22 (*SD* = 4.27, Range: 1 to 25.67), with higher scores indicating greater rejection sensitivity. Overall scale reliability was good ($\alpha = 0.85$).

Peer Problems. The Index of Peer Relations was used to assess peer problems (IPR; Hudson, 1982; Forte & Green, 1994). The IPR is a 25-item measure designed to assess the severity of problems in peer relationships and frequency of peer conflict. Each item is scored on a 7-point scale where 1 = *none of the time* and 7 = *all of the time*. Items were modified to ask about "kids my age" rather than "my peers." For instance, the item "I get along very well with my peers" was modified to "I get along very well with kids my age." Total scores are calculated by taking the sum score of all items and subtracting from this value the number of total items answered. This value is then multiplied by 100 and divided by the product of total items answered multiplied by six. Total scores range from 0 to 100 where higher scores indicate greater problems with peers. A score of 30 is typically used to signify a clinically relevant level of peer problems. Scores ranged from 0 to 84.67 (*M* = 27.62, *SD* = 16.90), with higher scores indicating increased peer problems. Scale reliability also was substantial ($\alpha = 0.96$).

Statistical analysis

First, the means and standard deviations of key variables are presented, as well as the correlations between them. Importantly, statistically significant correlations between pubertal status, role disruption, and the proposed mediating cognitive and behavioral tendency variables

supports multivariate modeling of direct and indirect pathways through which pubertal change influences role disruption.

Path analysis (structural equation modeling) was used to address the three research questions. Path analysis was the most appropriate method, as it permits test of direct and indirect effects of pubertal status on role disruption in longitudinal data (Shrout & Bolger, 2002). Rumination, rejection sensitivity, and peer problems were examined for the mediating effects of pubertal status on role disruption (see Figure 1) and the mediating effects of pubertal timing on role disruption (see Figure 2). Statistically significant indirect effects (for example, the effect of pubertal status on peer problems) provide support that peer problems, rumination, and rejection sensitivity link pubertal change to role disruption. Under conditions where the direct effect of pubertal status/timing on role disruption is not statistically significant when the indirect pathway is included, it may be concluded that effects of pubertal status/timing are "fully mediated." Age was included in the pubertal status model to establish that the effects of pubertal status were independent of the effects of chronological age. As a supplemental test, the four Role Disruption Questionnaire subscale scores were modeled as individual outcomes to examine domain-specific effects of the explanatory variables.

All models were fit in M*plus* 7.4 (Muthén & Muthén, 1998-2017). Missing data was addressed using FIML with robust standard errors to take into account the skewed distributions of the individual questionnaire items. Missing data ranged from 2-7% for variables measured at time 1, and from 42-44% for role disruption measured at time 2. Additional fit statistics were examined for each model to determine whether there was adequate model fit to the data. Model fit is considered good if the Tucker-Lewis Index (TLI) is greater than or equal to .95 and the Root Mean Square Error of Approximation (RMSEA) is less than or equal to .06 (Kline, 2005).

Results

Means, standard deviations, and Pearson correlations are presented in Table 1. Pubertal development had a significant positive correlation with role disruption (r = .26). Correlations between role disruption and other variables ranged from medium to strong with rumination (r = .43), anxious rejection sensitivity (r = .40), and peer problems (r = .47) all having significant, positive relationships with role disruption. Role disruption had the strongest relationship with angry rejection sensitivity (r = .50). Pubertal development was significantly correlated with rumination (r = .23) but was not significantly associated with either anxious or angry rejection sensitivity.

The mediation model for pubertal status fit the data well and full results are presented in Figure 1. Pubertal status had significant direct effects on peer problems (b = .14, p = .005) and rumination (b = .08, p = .001). Pubertal status did not have significant direct effects on angry rejection sensitivity (b = .11, p = .107) or anxious rejection sensitivity (b = .13 p = .101). Indirect effects were modeled from pubertal status on role disruption via peer problems, rumination, anxious rejection sensitivity, and angry rejection sensitivity. There was a significant indirect of pubertal status on role disruption via rumination (b = .06, p = .019). The indirect effects through peer problems, anxious rejection sensitivity, and angry rejection sensitivity were not significant. Rumination (b = .36, p = .004), angry rejection sensitivity (b = .22, p = .016), and age (b = .32, p = .002) had significant direct effects on role disruption. Rumination fully mediated the effect of pubertal status on role disruption. This model explained 39.7% (p < .001) of the variance of role disruption. Collectively, these findings suggest that the association between pubertal status and perceived role disruption is explained primarily by cognitive processes.

The mediation model for pubertal timing was fully saturated (full results presented in Figure 2). Pubertal timing had significant direct effects on peer problems (b = .11, p = .046) and

rumination (b = .07, p = .008). Pubertal timing did not have significant direct effects on angry rejection sensitivity (b = .13, p = .107) or anxious rejection sensitivity (b = .14 p = .097). Indirect effects were modeled from pubertal timing on role disruption via peer problems, rumination, anxious rejection sensitivity, and angry rejection sensitivity. There was a significant indirect of pubertal timing on role disruption via rumination (b = .03, p = .038). The indirect effects through peer problems, anxious rejection sensitivity, and angry rejection sensitivity were not significant. Rumination (b = .36, p = .008) and angry rejection sensitivity (b = .21, p = .030) had significant direct effects on role disruption. Rumination fully mediated the effect of pubertal timing on role disruption. This model explained 37.7% (p < .001) of the variance of role disruption, which is slightly decreased from the pubertal status mediation model. These results are similar to the pubertal status mediation model and also indicate that the association between pubertal timing and perceived role disruption is explained primarily by cognitive processes.

Further analyses were conducted with each role disruption questionnaire subscale as the outcome variable at Time 2. Analyses were run with only the pubertal status mediation model because the results for pubertal status and pubertal timing were highly similar for the total role disruption outcome models. The role disruption subscales included academic (*M* = 9.24, SD = 4.15), parent (*M* = 9.04, SD = 4.22), peer (*M* = 7.89, SD = 3.61), and friend (*M* = 8.88, SD = 3.35) disruption. Subscale means did not significantly differ from each other. Results of the subscale analyses using the mediation model for pubertal status indicated that rumination was the only direct significant predictor for the parental disruption (b = .21, p = .009) and pubertal status had an indirect effect on parental disruption via rumination (b = .05, p = .031). Friend disruption was directly predicted by rumination (b = .22, p = 0.007) and angry rejection sensitivity (b = .44, p = .002). Pubertal status had an indirect effect on friend disruption via rumination (b = .05, p =

.038). Peer disruption was directly predicted by peer problems (b = .40, p = .002), as well as both anxious (b = -.28, p = .003) and angry rejection sensitivity (b = .32, p = .016). Pubertal status had an indirect effect on peer disruption via peer problems (b = 0.08, p = .038). No predictor had significant direct or indirect effect on academic disruption.

Discussion

The adolescent transition is universal in occurrence, but not universal in experience. The present study is the first to examine pathways that may explain which girls find changes in life circumstances during the adolescent transition to be most disrupting. This aspect of psychological distress during the adolescent transition has been understudied in a literature that tends to favor psychopathological outcomes. However, perceived disruption may serve as an important antecedent to negative developmental trajectories associated with helplessness (Rudolph, Kurlakowsky, & Conley, 2001). Girls who interpret the changes associated with the adolescent transition as more disruptive may lean on these perceptions as they renegotiate and reevaluate themselves and their lives, setting them up for more negative appraisals. Normative changes that come with the adolescent transition, such as interacting with new peers or being given more challenging schoolwork, may become daily reminders of how life, relationships, and activities have significantly changed.

Present results suggest that girls who were more physically developed reported more rumination and difficulties getting along with other youth of the same age. Girls predisposed to rumination may be getting caught dwelling on the changes of puberty, which in turn impacts their ability to problem-solve and implement solutions in the novel, ambiguous contexts associated with the adolescent transition (Ward, Sousa, & Nolen-Hoeksema, 2003). They may also spend more time focusing on the negative changes they are experiencing, which may

heighten perceptions of disruption amid life changes. In the present study, rumination fully mediated the relationship between pubertal status and role disruption and provided the pathway for all but one of the indirect effects pubertal status had on peer, friend, and parent disruption. This finding highlights the importance of rumination in explaining the individual differences in perceived disruption during the adolescent transition. Girls who are more predisposed to rumination may rely on this internal tendency to guide them through the ambiguity of the adolescent transition. Consequently, these girls may spend more time and cognitive resources mulling over negative or uncertain information, which, as a result, may heighten perceptions of life disruption.

In addition to rumination, angry rejection sensitivity, but not anxious rejection sensitivity, conferred significant vulnerability for perceived disruption. While feelings of anger and anxiety are highly correlated when expecting rejection, the anxious and angry subtypes of rejection sensitivity distinguish between which youth choose "fight" and which choose "flight" in response to rejection (London, Downey, & Bonica, 2007). It seems that the increased aggression associated with angry rejection sensitivity leads to more perceived disruption than the social withdrawal associated with anxious rejection sensitivity, perhaps because confrontations with peers may feel like a clear indicator of daily life disruption.

The strong and significant correlative relationship between rumination and angry rejection sensitivity suggests that girls who tend toward one of these predispositions likely have tendencies toward the other one as well. Accordingly, rumination and angry rejection sensitivity may play into each other to heighten perceived life disruption wherein ruminating on negative information may guide maladaptive strategies that increase expectations of rejection. In turn,

increased expectations of social rejection may prompt girls to act out negatively toward peers and further exacerbate feelings of disruption with peers and friends.

Pubertal timing did not have substantially different effects on role disruption or cognitive and behavioral tendencies than did pubertal status. In fact, pubertal status explained slightly more variance in the model than did pubertal timing. This finding is perhaps contrary to expectation because of the rich literature demonstrating the added vulnerability early timing confers to many psychosocial outcomes. One possibility is that while the physical changes of puberty are jarring, it is the individual differences in reactions to and perceptions of these changes that affect role disruption regardless of their timing. Further research should be conducted in order to determine if the effects of pubertal status and timing remain stable across different samples of early adolescent girls.

Although the individual domains of perceived role disruption were examined, no single cognitive or behavioral style was predictive of perceived disruption in each of the domains of friends, peers, parents, and academics. These findings suggest that individual predispositions and pubertal development work together across domain changes to create an overall sense of perceived disruption. Rumination was predictive of both parent and friend disruption, but not of peer disruption. It is possible that girls are more concerned with spending time and cognitive resources on ruminating about changes to close, personal relationships first, which exacerbates their perceptions of disruptive change in these domains. Conversely, the direct effects of angry rejection sensitivity on both peer and friend disruption suggest that girls who react angrily to rejection expectations may disrupt their relationships with kids their own age regardless of closeness. The increased aggression and peer conflict associated with angry rejection sensitivity may hinder the ability to problem-solve novel social situations during this transition. Notably,

anxious rejection sensitivity had a negative relationship with peer disruption, which seems slightly counterintuitive given that rejection sensitivity is linked to increased problems with peers (London, Downey, & Bonica, 2007). Since anxious rejection sensitivity is linked to friendship instability (Croft & Zimmer-Gembeck, 2014, it may be that girls who tend toward anxious rejection sensitivity are more concerned about their interactions with friends but do not necessarily feel disrupted in these relationships, as supported by the nonsignificant pathway from anxious rejection sensitivity to friend disruption. Also notable is the result that no cognitive or behavioral variable predicted academic disruption. Further research is needed to determine if academic disruption is purely a product of the increasing difficulty of schoolwork and expectations of independent responsibility that come with progressing grade levels.

Following the links between perceived disruption and helplessness (Rudolph, Kurlakowsky, & Conley, 2001) and helplessness and depression (Nolen-Hoeksema & Girgus, 1995), perceived disruption may be an early indicator of depression risk (see Appendix B). Identifying susceptibility to perceived disruption early on may improve the success of prevention and intervention programs aimed at mitigating depression onset. Such programs should target attributional styles so as to reduce helplessness attributions, as well as work to normalize individual perceptions of developmental changes. Providing disrupted youth with resources to address the perceived changes in their lives may help reduce associated psychological distress that may affect the quality of academic performance, relationships with peers and friends, and family relationships. Feeling less disrupted in these central life domains may help increase feelings of mastery and decrease feelings of helplessness that may reduce depression risk in the long term.

There are several notable limitations to the present findings. First, the present study only includes girls. While girls are at elevated risk for negative outcomes associated with the challenges and stressors of puberty as compared to boys, future research should include boys to determine if there are gender differences in perceived life changes disruption during the adolescent transition. In addition, the present study is limited by a predominantly European American sample of girls. Although this is demographic make-up is reflective of the region in which the data were collected, it means that these results are not generalizable to the broader experiences of girls with different racial and ethnic backgrounds. Finally, it should be noted that the present study measured puberty using the Pubertal Development Scale, which is a self-report measure. As with all self-report data, self-reports of pubertal development vary in the degree to which they reflect accurate biological maturation.

The present study is the first to examine longitudinal predictors of perceived disruption during the adolescent transition. Although puberty constitutes sweeping changes that all individuals must navigate, pubertal development itself does not directly explain differences in perceived disruption to life circumstances. Rather, perceived disruption is explained by individual differences in cognitive and behavioral styles. Present findings suggest that rumination and angry rejection sensitivity are most predictive of overall perceived disruption, while peer problems and anxious rejection sensitivity seem to affect peer disruption in particular. It is encouraging that cognitive and behavioral tendencies were more predictive of perceived disruption than puberty because these tendencies are malleable for intervention in a way that physical development is not. Interventions that target the way girls perceive and react to normative changes may help reduce individual differences in role disruption. For instance, cognitively focused expressive writing has been shown to improve long-term social adjustment

in early adolescents (Travagin, Margola, Dennis, & Revenson, 2016). Future research should determine if such interventions can similarly impact rejection sensitivity and rumination in early adolescent girls, and, as a result, if these effects carry through to perceived life disruption.

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Table 1. *Descriptive statistics*

	Measure	1	2	3	4	5	6	7
1	Age	–						
2	Pubertal Development	**.37** (.07)	–					
3	Rumination	.12 (.08)	**0.23** (.07)	–				
4	Rejection Sensitivity (Anxious)	.08 (.07)	0.13 (.07)	**0.39** (.07)	–			
5	Rejection Sensitivity (Angry)	.22 (.07)	0.13 (.07)	**0.33** (.07)	**0.76** (.05)	–		
6	Peer Problems	**.19** (.07)	**0.21** (.07)	**0.40** (.07)	**0.58** (.06)	**0.56** (.07)	–	
7	Role Disruption	**.38** (.09)	**0.26** (.09)	**0.43** (.09)	**0.40** (.09)	**0.50** (.08)	**0.47** (.09)	–
	N	183	182	179	185	184	184	109
	M	11.70	10.02	13.28	9.23	7.22	27.62	35.05
	SD	1.05	2.58	8.87	4.89	4.27	16.90	12.08

Note. Significant correlations ($p \leq .05$) are bolded. Standard errors given in parentheses.

Reported role disruption values are from time 2 and all other values are from time 1.

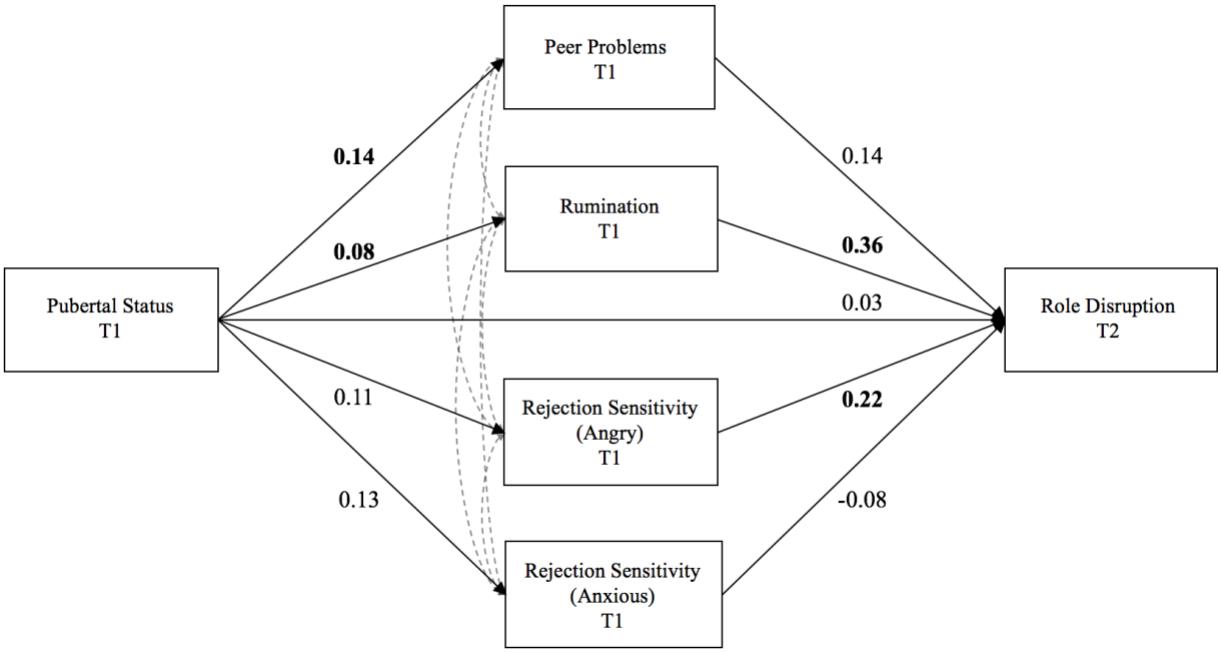


Figure 1. Unstandardized estimates for pubertal status model

TLI = 1.008, RMSEA = .000 (.000, .104). Solid lines represent primary paths of the model and dotted lines represent nonprimary paths. Age was covaried but was not included in the figure. Significant estimates are bolded ($p < .05$).

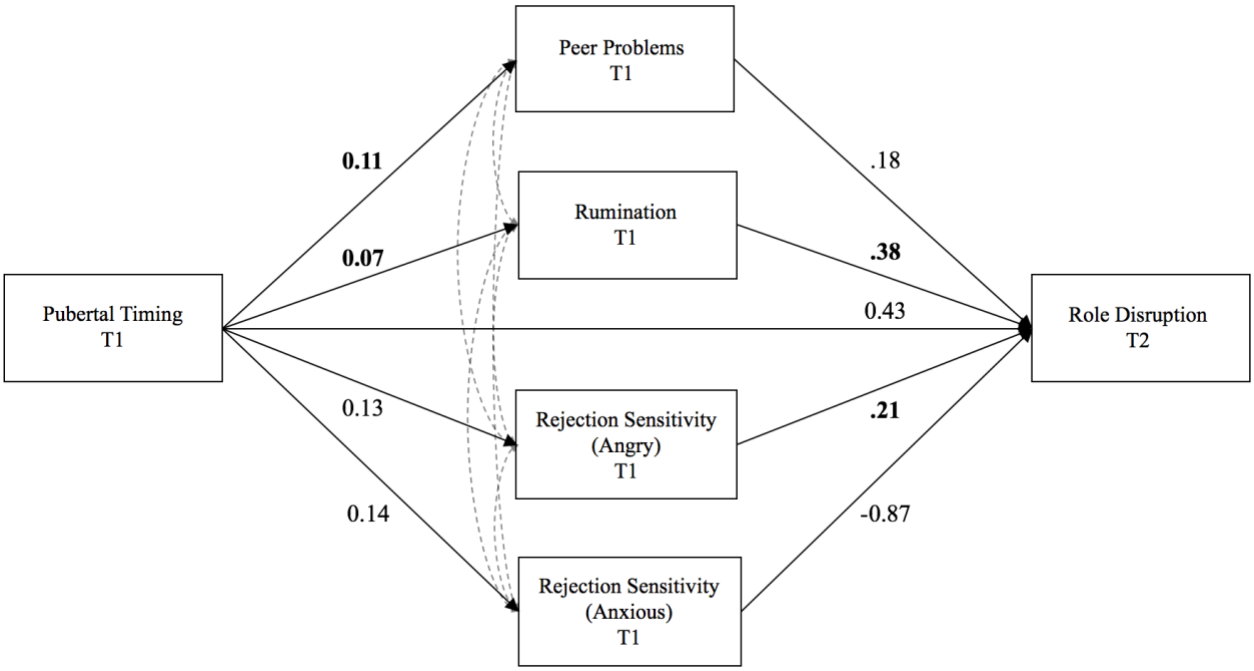


Figure 2. Unstandardized estimates for pubertal timing model

Unstandardized estimates of the mediation model for pubertal timing. The model was fully saturated: TLI = 1.000, RMSEA = .000 (.000, .000). Solid lines represent primary paths of the model and dotted lines represent nonprimary paths. Significant estimates are bolded ($p < .05$).

Appendix A

Longitudinal Measurement Invariance of the Role Disruption Questionnaire

Measurement is a fundamental issue in the psychological sciences. Of particular concern to developmental researchers is how reliable measures are across time. While traditional indicators like Pearson correlations can give information about test-retest reliability, these indicators cannot assess the psychometric equivalence of a construct over time or across groups. In other words, how do we know whether the construct we are measuring means the same thing to participants at different measuring occasions? Measurement invariance tests the assumption that a theoretical construct both has the same meaning and is psychometrically equivalent across groups or measurement occasions (Putnick & Bornstein, 2016). Without measurement invariance, there is no substantive meaning in group difference comparisons because the groups were not using the same conceptual frame of reference when responding (Vandenberg & Lance, 2000). Establishing measurement invariance is a prerequisite to the meaningful comparison of group means, but it is often a step that skipped or neglected by researchers.

Measurement invariance is typically tested in a structural equation modeling framework using confirmatory factor analysis to compare a hierarchical set of models with increasingly strict constraints. The recommended steps of constraints differ depending on the source consulted. In the most-cited paper on measurement invariance, Vandenberg and Lance (2000) recommended eight steps for testing measurement invariance. The first five steps test for invariant covariance matrices, equivalence of model form (configural invariance), equivalence of factor loadings (metric invariance), equivalence of item intercepts or thresholds (scalar invariance), and equivalence of unique variances (strict invariance). The remaining three steps test structural invariance of the derived latent factor (i.e., factor variances, co-variances, and

mean). More modern measurement invariance testing recommendations eschew testing invariant covariance matrices as the first step because it provides little information about measurement invariance if the test fails. In addition, modern checklists do not uniformly recommend testing the structural invariance of the latent factor (e.g., van de Schoot, Lugtig, & Hox, 2012). Other recommendations include running omnibus tests or conducting exploratory factor analyses as first steps in testing measurement invariance (e.g., Li, Harmer, Chi, & Vongjaturapat, 1996).

Present analyses will adhere to modern recommendations by testing for configural, metric, scalar, and strict measurement invariance in a series of four modeling steps (see Figure 1 for example). Configural invariance tests whether the theoretical construct has the same pattern of free and fixed factor loadings. This is often considered the "baseline" model for measurement invariance because subsequent tests are only meaningful if configural invariance is achieved. If configural invariance is not supported, then this means that the pattern of items' loadings on the latent factor differs across measurement occasions (Putnick & Bornstein, 2016). Invariance testing should be discontinued and meaningful comparisons and means across measurement occasions cannot be made.

If configural invariance is supported, more stringent measurement invariance tests can be conducted. The next step is to test for metric invariance by constraining factor loadings to be equivalent across measurement occasions. This means that each item contributes to the latent construct to a similar degree across measurement occasions. Metric invariance is generally considered the minimum level of measurement invariance a construct should achieve before interpreting differences in means across groups or occasions. The next step is scalar invariance, which means that differences in the latent construct capture all mean differences in the shared variance of the items. Scalar invariance is tested by constraining item intercepts to be equivalent.

While many researchers advocate for this test, others argue that scalar invariance is not always critical because intercepts are location parameters that may vary arbitrarily by the sample (Vandenberg & Lance, 2000). The final step is to test that unique (or residual) variances are equivalent across measurement groups. Residual invariance is not required for comparing mean differences across measurement occasions because item residuals do not affect the interpretation of differences in latent construct means, but it is a required condition for full factorial invariance (Putnick & Bornstein, 2016).

Models are assessed both by their goodness of fit indicators (e.g., a Tucker-Lewis Index (TLI) greater than or equal to .95 and a Root Mean Square Error of Approximation (RMSEA) less than or equal to .06; Kline, 2005) and by a nested model comparison using the rescaled difference in the model −2LL values as a function of the difference in model degrees of freedom (Vandenburg & Lance, 2000). Since configural invariance is the first model tested, it is assessed solely on goodness of fit indicators. If the fit is poor, configural oninvariance is assumed. Moving forward, as model constraints are increasingly introduced, the more constrained model is compared to the previous, less constrained model in the nested model comparison. If the fit is good and if the chi-square value is not statistically significant, then the more constrained model is retained, and further measurement invariance testing can be pursued. If the chi-square value is statistically significant, then the less constrained model is retained, and measurement invariance testing is ended.

Role disruption and measurement invariance

The Rudolph, Kurlakowsky, and Conley (2001) article that first established the construct of role disruption and the Role Disruption Questionnaire (RDQ) did not include a discussion of psychometrics, factor structure, or measurement invariance. Given that role disruption is the

central outcome variable of the present paper, further analyses were conducted to investigate the measurement invariance of RDQ and whether or not comparisons of RDQ means between measurement occasions are meaningful.

As previously described, the RDQ is a 20-item self-report measure reflecting the extent to which respondents feel they have experienced disruptions since the previous school year in the domains of academics, peers, friends, and family (Rudolph, Kurlakowsky, & Conley, 2001). Each item is rated on a 5-point scale, ranging from 1 = *not at all* and 5 = *very much.* Responses were summed into academic, peer, and family subscales, and these subscales were added together for an overall score of role disruption. Measurement invariance for the RDQ was tested with a sample of 132 girls recruited through a research partnership established with New York State 4-H in 2015. Girls were, on average, 11.66 years of age at the start of the study (*SD* = 1.02; Range: 9-14 years), and 11.84 years (*SD* = .91) at follow-up. Girls self-identified as primarily European American (81.48%), with 19.52% of the sample identifying as African American, Latina, Asian, or biracial. Each of the four subscales (i.e., academic, peer, friend, and family disruption) were tested for invariance across the two measurement occasions approximately four months apart. All analyses were conducted using the Mplus software package (Muthén, & Muthén, 1998-2015). Missing data was handled using maximum likelihood estimation with robust standard errors.

Full results of the measurement invariance testing can be viewed in Table 1. Invariant uniqueness was found for both the academic and parent disruption subscales; configural invariance was found for the peer disruption subscale; and the friend disruption subscale did not achieve configural invariance. It is notable that the friend disruption subscale did not achieve configural invariance. This indicates that the basic organization of the construct is not supported

across measurement occasions and that the construct either needs to be redefined or that the construct must be assumed to be noninvariant (Putnick & Bornstein, 2016). It is unlikely that the friend disruption subscale is uniquely noninvariant when the other subscales in the RDQ achieve at least some degree of invariance. It is also notable that the peer disruption factor failed to achieve metric invariance. Taken together, these results suggest there may be a conceptual issue with the way peers and friends were split into separate factors. In fact, in the original role disruption article by Rudolph, Kurlakowsky, and Conley (2001), it was reported that the peer and friend subscales were summed together because their results were not distinguishable from each other. It is also possible that the smaller sample size of the 2015 Expressive Writing data affected parameter estimation due to lack of power. Consequently, it is possible that increasing the number of observations in the data may help the fit of parameter estimates.

Testing the original sample

Rudolph, Kurlakowsky, and Conley (2001) did not report measurement invariance when first reporting on role disruption and the RDQ. In order to determine how issues with the measurement noninvariance for the peer and friend disruption factors in the 2015 Expressive Writing data compared to the original data, I contacted Dr. Karen Rudolph for access to the original data.

The original data comes from the University of Illinois Transition to Adolescence Project. Participants were early adolescents from several Midwestern school districts representing both rural and small urban communities. Data collection began in 1999 and included a baseline wave at the start of a fall school semester, a follow-up wave in the spring semester, and a second follow-up wave during the next fall semester. Two cohorts were recruited. The first cohort included 471 fifth graders (*M* age = 11.2 years, SD = 0.50; 49.9%

female; 68.2% White; 26.8% African American; 1.9% Asian American; 1.5% Latino; 1.7% other). The second cohort included 587 fifth and sixth graders (*M* age = 11.7 years, SD = 0.67; 50.4% female; 61.8% White; 31.9% African American; 3.9% Asian American; 0.3% Latino; 2.0% other). Cronbach's alpha = 0.89. All measurement invariance analyses were conducted using the Mplus software package (Muthén, & Muthén, 1998-2015). Each of the four subscales (i.e., academic, peer, friend, and family disruption) were tested for invariance across the first two measurement occasions. Missing data was handled using maximum likelihood estimation with robust standard errors.

Full results of the measurement invariance testing of the RDQ with the University of Illinois Transition to Adolescence Project data can be viewed in Table 2. The parent disruption subscale similarly achieved unique invariance, but the academic disruption subscale only achieved metric invariance in this dataset. The basic structural invariance of these two subscales seems consistent enough across the two samples to accept mean comparisons. The peer disruption subscale achieved metric invariance in the original dataset, which supports the equality of factor loadings for this construct across measurement occasions. However, the friend disruption subscale also failed to achieve configural invariance in the original dataset.

Discussion

While the parent and academic disruption factors achieved at or beyond metric invariance in both samples, the friend and peer disruption factors achieved less stable measurement invariance results. Given the size of the original University of Illinois Transition to Adolescence Project sample, it seems unlikely that this is purely an issue of sample size. Present findings support the hypothesis that the friend and peer disruption factors should not be separated into two factors. Rudolph, Kurlakowsky, and Conley (2001) did not report factor analysis or the

factor structure of the items in the original article. An exploratory factor analysis should be conducted to see if a three-factor structure actually does fit the data better than the original four-factor structure. Factor loadings should also be analyzed to determine if the combined 10 peer and friend disruption items are all needed to capture peer/friend disruption.

Further analyses should also determine if all 20 items of the RDQ are needed or appropriate. For example, items like "I need to spend more time on homework" (Item 13) do not necessarily capture a sense of disrupted role or self in the academic domain. There may be many reasons that youth need to spend more time on homework (e.g., there is more of it, they have started a new after-school activity, etc.) that are not particularly disrupting to daily life roles. Trimming a few poorly loading items from the RDQ may provide a tighter conceptual thread that translates to a more invariant conceptual framework across groups and measurement occasions.

Table 2. *Measurement Invariance of the Role Disruption Questionnaire Using 2015 Expressive Writing Data*

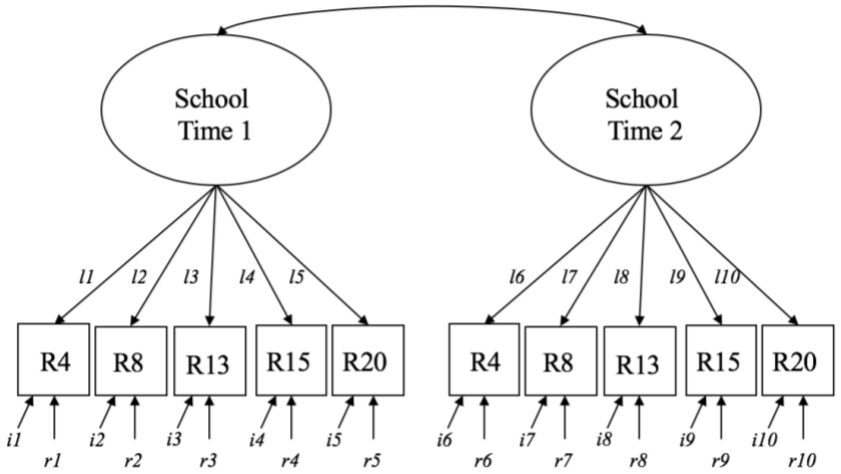
Factor	Model	df	log-likelihood	scale	parameters	RMSEA	TLI	SRMR	Δdf	χ^2
Academic	1. Configural	29	-1243.704	1.7117	36	0.04	0.97	0.054	–	–
	1 versus 2	–	–	–	–	–	–	–	5	6.03
	2. Metric	34	-1249.137	1.697	31	0.04	0.97	0.08	–	–
	2 versus 3	–	–	–	–	–	–	–	5	1.01
	3. Scalar	39	-1249.644	1.8308	26	0.028	0.988	0.081	–	–
	3 versus 4	–	–	–	–	–	–	–	5	1.1
	4. Invariant Uniqueness	44	-1250.802	1.767	21	0	1	0.081	–	–
Parent	1. Configural	29	-1235.871	1.6801	36	0.076	0.902	0.069	–	–
	1 versus 2	–	–	–	–	–	–	–	5	3.25
	2. Metric	34	-1238.62	1.6784	31	0.065	0.928	0.082	–	–
	2 versus 3	–	–	–	–	–	–	–	5	2.77
	3. Scalar	39	-1239.961	1.8151	26	0.059	0.94	0.084	–	–
	3 versus 4	–	–	–	–	–	–	–	5	7.13
	4. Invariant Uniqueness	44	-1246.055	1.8401	21	0.059	0.941	0.086	–	–
Peer	1. Configural	29	-1195.02	1.7702	36	0.027	0.985	0.069	–	–
	1 versus 2	–	–	–	–	–	–	–	5	16.07*
	2. Metric	34	-1213.34	1.688	31	0.068	0.91	0.145	–	–
Friend	1. Configural	29	-1437.288	1.4953	36	0.055	0.784	0.096	–	–

Note. * = $p < .05$

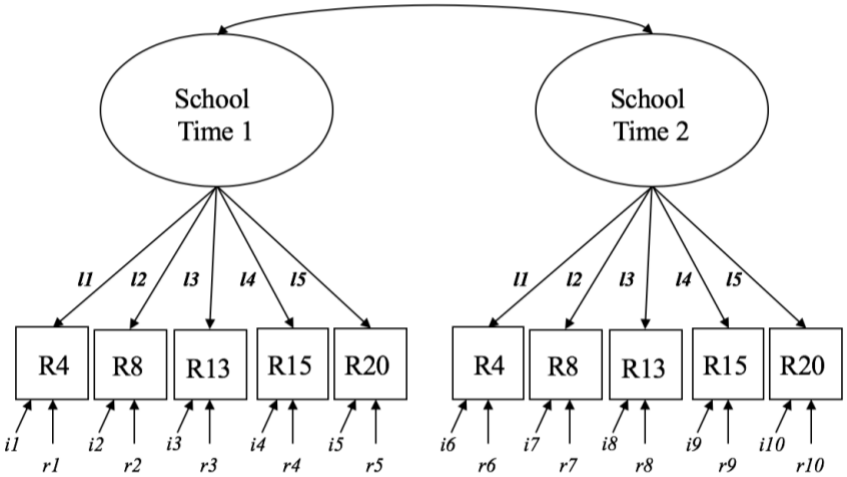
Table 3. *Measurement Invariance of the Role Disruption Questionnaire Using University of Illinois Transition to Adolescence Project Data*

Factor	Model	df	log-likelihood	scale	parameters	RMSEA	TLI	SRMR	Δdf	χ^2
Academic	1. Configural	29	-7959.501	1.4194	36	0.039	0.971	0.037	–	–
	1 versus 2	–	–	–	–	–	–	–	5	3.11
	2. Metric	34	-7961.758	1.4142	31	0.034	0.977	0.041	–	–
	2 versus 3	–	–	–	–	–	–	–	5	15.01*
	3. Scalar	39	-7969.338	1.4919	26	0.037	0.974	0.044	–	–
Parent	1. Configural	29	-7222.923	2.127	36	0.064	0.902	0.044	–	–
	1 versus 2	–	–	–	–	–	–	–	5	4.26
	2. Metric	34	-7226.906	2.1688	31	0.058	0.919	0.051	–	–
	2 versus 3	–	–	–	–	–	–	–	5	2.71
	3. Scalar	39	-7228.249	2.3955	26	0.055	0.927	0.05	–	–
	3 versus 4	–	–	–	–	–	–	–	5	2.04
	4. Invariant Uniqueness	44	-7231.077	2.305	21	0.048	0.944	0.051	–	–
Peer	1. Configural	29	-6624.436	2.3366	36	0.029	0.978	0.03	–	–
	1 versus 2	–	–	–	–	–	–	–	5	6.44
	2. Metric	34	-6632.265	2.3212	31	0.028	0.98	0.043	–	–
	2 versus 3	–	–	–	–	–	–	–	5	29.97*
	3. Scalar	39	-6647.263	2.5751	26	0.036	0.966	0.044	–	–
Friend	1. Configural	29	-7911.432	1.7332	36	0.067	0.777	0.081	–	–

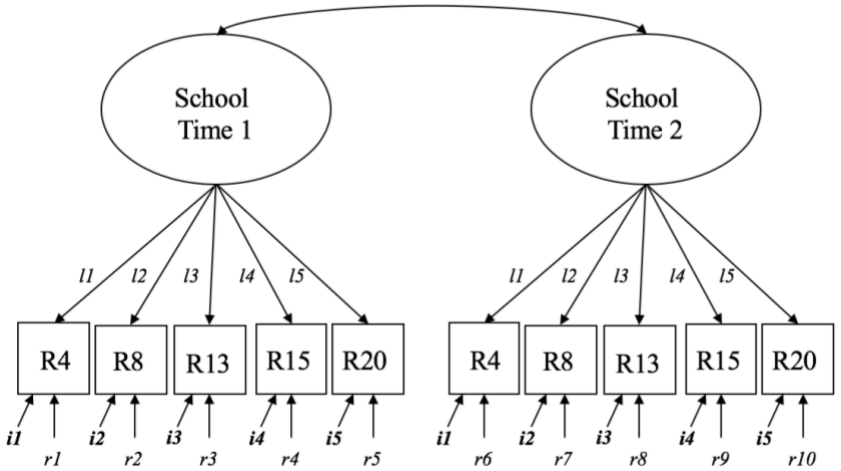
Step 1. Configural Invariance



Step 2. Metric Invariance



Step 3. Scalar Invariance



Step 4. Unique Variance

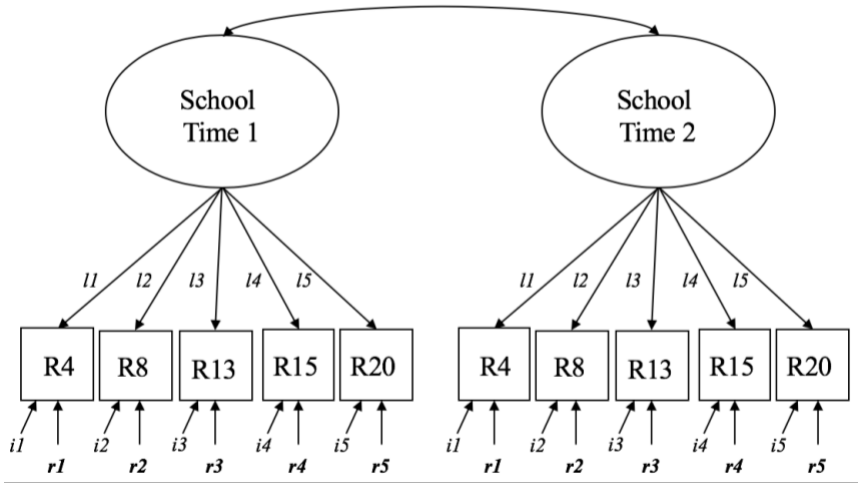


Figure 3. Confirmatory factor analysis example

An example of confirmatory factor analysis of the academic disruption factor from the Role Disruption Questionnaire across Time 1 and 2. All parameters are freely estimated in the configural invariance model (Step 1). Parameters are gradually constrained to be equal across measurement occasions with each step. Focal constraints of each additional model are indicated in Steps 2-4 by bolded parameters.

Appendix B

The Relationship Between Role Disruption and Depression

The onset of puberty has consistently been linked to the increasing prevalence rates for psychological problems as girls undergo the adolescent transition (reviewed in Mendle, 2014). Depression has received considerable attention as an outcome of interest during the adolescent transition. As present role disruption results indicated, girls need not have atypical experiences of puberty and its timing to feel disrupted by its onset, nor does an outcome need to be depression in order for it to be disrupting to day-to-day quality of life. In fact, perceived disruption may be an early indicator of depression risk. Since perceived disruption has been linked to helplessness (Rudolph, Kurlakowsky, & Conley, 2001) and an association between helplessness and depression has been established (Nolen-Hoeksema & Girgus, 1995), greater feelings of role disruption at one time point may increase vulnerability to later depression onset.

Additional analyses were conducted in order to determine if role disruption predicted future depression. All analyses were conducted using the Mplus software package (Muthén, & Muthén, 1998-2015). Initial linear regression results indicated that role disruption at time 1 significantly predicted depression at time 2 ($b = .272$, $p = .005$) even when accounting for baseline depression symptoms ($b = .420$, $p = .001$). Next, time 2 role disruption and time 3 depression were found to have a significant positive relationship ($r = .41$, $p = .005$; see Table 1). Finally, time 3 depression was added as an outcome to the pubertal status meditation model (see Figure 1). Results indicated that role disruption at time 2 significantly predicted depression at time 3 ($b = 0.46$, $p = .001$), and time 1 rumination ($b = 0.17$, $p = .016$) and time 1 angry rejection sensitivity ($b = 0.10$, $p = .014$) both had indirect effects on time 3 depression via role disruption at time 2.

These additional findings suggest that role disruption is a unique predictor of depression. This has important implications for prevention and intervention programs aimed at reducing depression vulnerability. Girls who report feeling particularly disrupted by the adolescent transition may be at increased risk for greater depression symptoms in the future. Accordingly, programs should be aimed at helping girls navigate this transition and normalize perceived major life changes.

Table 4. *Descriptive statistics including time 3 depression*

	Variable	1	2	3	4	5	6	7	8
1	Age	–							
2	Pubertal Status	**.37** (.07)	–						
3	Rumination	.12 (.08)	**.23** (.07)	–					
4	Rejection Sensitivity (Anxious)	.08 (.07)	.13 (.07)	**.39** (.07)	–				
5	Rejection Sensitivity (Angry)	.22 (.07)	.13 (.07)	**.33** (.07)	**.76** (.05)	–			
6	Peer Problems	**.19** (.07)	**.21** (.07)	**.40** (.07)	**.58** (.06)	**.56** (.07)	–		
7	Role Disruption	**.38** (.09)	**.26** (.09)	**.43** (.09)	**.40** (.09)	**.50** (.08)	**.47** (.09)	–	
8	Depression	.09 (.14)	**.45** (.13)	**.30** (.13)	.24 (.14)	.19 (.14)	.25 (.14)	**.41** (.14)	–
	N	183	182	179	185	184	184	109	52
	M	11.70	10.02	13.28	9.23	7.22	27.62	35.05	15.40
	SD	1.05	2.58	8.87	4.89	4.27	16.90	12.08	11.18

Note. Significant correlations ($p \leq .05$) are bolded. Standard errors given in parentheses. Reported role disruption values are from time 2 and depression values are from time 3. All other reported values are from time 1.

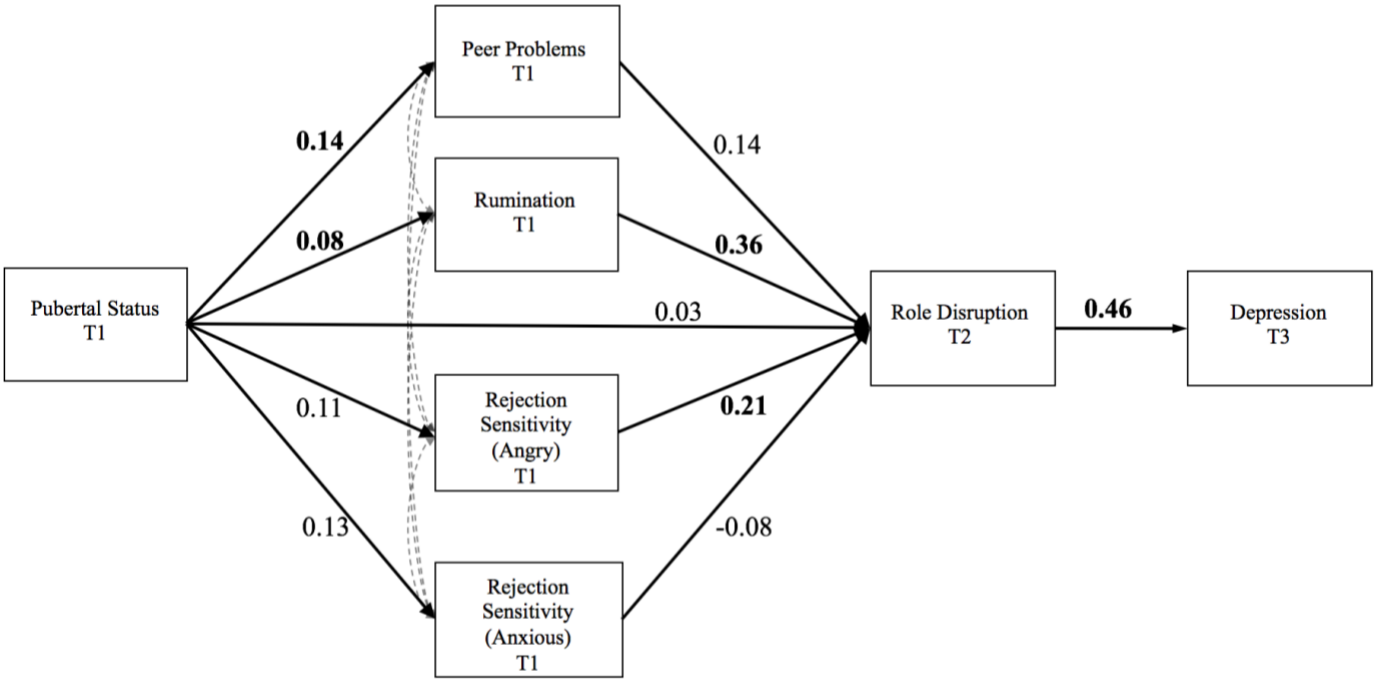


Figure 4. Unstandardized estimates of the path analysis model predicting time 3 depression TLI = 0.912, RMSEA = .072 (.022, .119). Solid lines represent primary paths of the model and dotted lines represent nonprimary paths. Age was covaried but was not included in the figure. Significant estimates are bolded ($p < .05$).